

## REMARKS

Reconsideration and allowance of the subject application are respectfully solicited in view of the following remarks.

Claims 1, 7, 8, and 10 are pending, with Claims 1 and 10 being independent.

Claims 2-6 and 9 previously have been cancelled without prejudice.

Claims 1, 7, 8 and 10 were rejected under 35 U.S.C. § 102(e), over U.S. Patent No. 6,674,949 B2 (Allan et al.).

This rejection is respectfully traversed for the following reasons.

Independent Claim 1 relates to an optical deflector comprising a photonic crystal, light lead-in means, and external force application means. The photonic crystal section comprises a material having through holes. The light lead-in means is for leading in light to the photonic crystal section. The external force application means is for deforming the photonic crystal section by way of mechanical external force and changing the angle of refraction of the light led in by the light lead-in means in the photonic crystal section. The external force application means is adapted to apply mechanical external force to the photonic crystal section in a direction perpendicular to the direction of cyclicity of a cyclic structure of the photonic crystal section so as to shift the angle of refraction in the photonic crystal section.

In contrast, the patent to Allan et al. is not understood to disclose or suggest that the external force application means is adapted to apply mechanical external force to the photonic crystal section in a direction perpendicular to the direction of cyclicity of a cyclic

structure of the photonic crystal section so as to shift the angle of refraction in the photonic crystal section, as recited by Claim 1.

Page 3 of the Office Action states that “As shown in figure 23, the actuator (154) exerts a mechanical force in a direction perpendicular to the direction cyclicity”. But Figure 3 is not a diagram that illustrates via words or symbols, the direction of application of the mechanical force, or the direction of cyclicity of a cyclic structure of a photonic crystal section. Rather, this figure is “a cross-sectional view of a mechano-optic planar photonic crystal defect waveguide device” (column 6, lines 56-57), illustrating in cross-section, a controller 56, a slab of material 122, an upper clad region 106, and an actuator 154. No reference numerals or symbols are used to denote the force application direction or the direction of cyclicity. In addition, the only other description of Figure 23 is found at column 10, lines 17-42 of the specification, and this description does not discuss either the direction of application of a mechanical external force or the direction of cyclicity of a cyclic structure of a photonic crystal:

Alternatively, the slab 122 may consist of a material with a substantial stress-optic coefficient, as shown in FIG. 23. Materials with a substantial stress-optic coefficient have a substantial change in refractive index when they are subject to a stress, and include, for example, inorganic glasses and polymers, and especially main chain liquid crystalline polymers. The slab 122 is coupled to an actuator 154 that serves to place a stress on the slab of material 122. The actuator 154 is coupled to a controller 156. In this case, the slab 122 is preferably not in direct contact with the planar photonic crystal slab to avoid the mechanical transfer of stress to the planar photonic crystal slab 110 itself, but is as close as possible so as to maximize the volume of the upper clad region 106 that is filled with the slab 122. Alternatively, a material with a substantial mechano-optic coefficient may be employed in the slab 122 of this device. A mechano-optic

material undergoes a change in refractive index with a change in dimension. This material may be, for example, a material with a glass transition temperature below 10.degree. C., such as poly(dimethylsiloxane). In both the stress-optic and the mechano-optic case, actuating the material causes a controllable change in effective refractive index of the slab 122, and modifies the propagation of an optical signal in the defect waveguide 111. In both cases, the actuator 154 may be, for example, a piezoelectric actuator.

In view of the lack of explicit disclosure in either Figure 23 or the description thereof in the specification of a direction of application of external force to a photonic crystal that is perpendicular to the direction of cyclicity of a cyclic structure of the photonic crystal, the Office Action is arguing that this feature is inherent.

Since the Office Action is arguing the inherency of this feature, the Office is required to satisfy the requirement for establishing inherency under MPEP § 2112. This portion of the MPEP requires that the claimed feature *must* necessarily be present in the reference to support a conclusion of inherency:

The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993) (reversed rejection because inherency was based on what would result due to optimization of conditions, not what was necessarily present in the prior art); *In re Oelrich*, 666 F.2d 578, 581-82, 212 USPQ 323, 326 (CCPA 1981). "To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.'" (emphasis in the original)

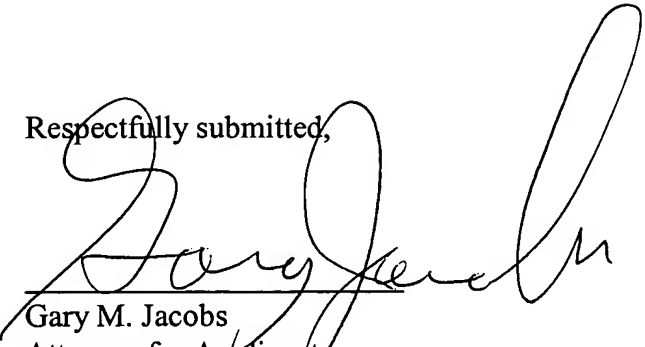
But, the Office Action has not established that the Allan et al. patent *necessarily* shows an external force application means that is adapted to apply mechanical external force to a photonic crystal section in a direction perpendicular to the direction of cyclicity of a cyclic structure of the photonic crystal. Therefore, MPEP § 2112 prohibits a finding of the inherency of these features in the Allan et al. patent. For this reason, Applicant respectfully submits that the Patent Office has not satisfied its burden of proof to establish the anticipation of Claims 1, 7, 8, and 10 by the Allan et al. patent. Accordingly, Applicant respectfully requests that the rejection of these claims be withdrawn.

The dependent claims are also submitted to be patentable because they set forth additional aspects of the present invention and are dependent from independent claims discussed above. Therefore, separate and individual consideration of each dependent claim is respectfully requested.

In view of the above amendments and remarks, the application is now in allowable form. Therefore, early passage to issue is respectfully solicited.

Applicant's attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,



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